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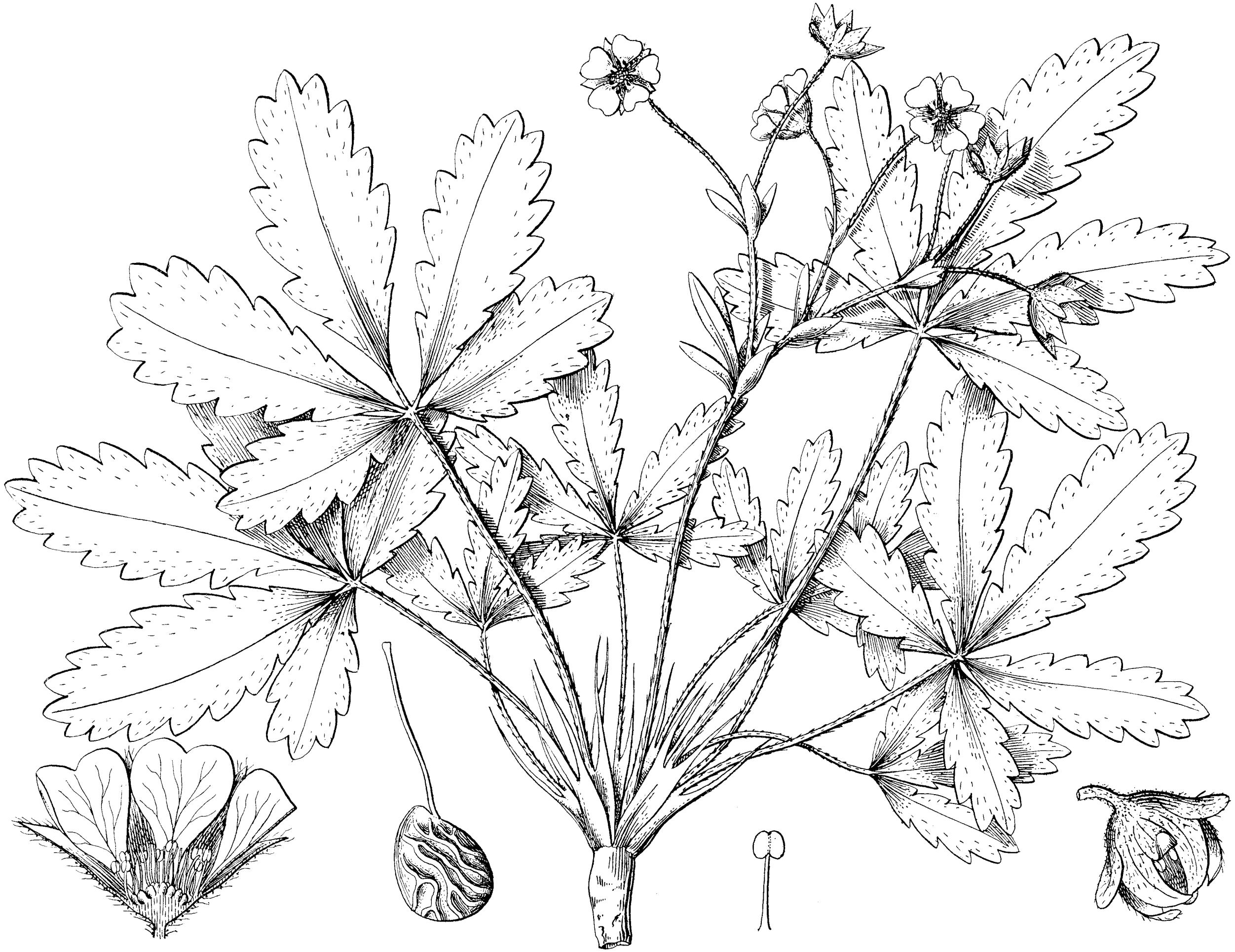
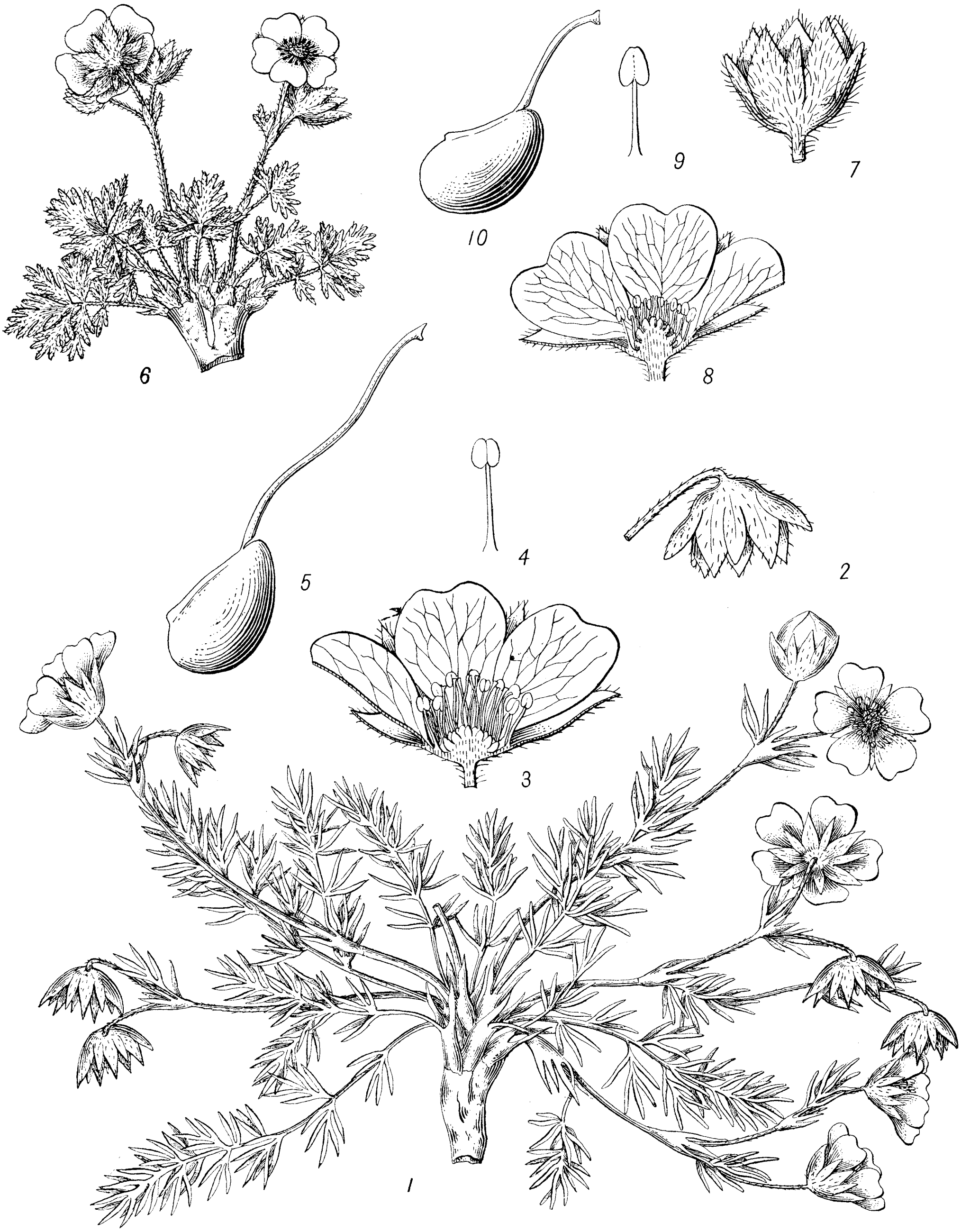
BULLETIN OF THE TORREY BOTANICAL CLUB. PLATE 276.



POTENTILLA RAMULOSA RYDBERG.



1–5. POTENTILLA MILLEFOLIA RYDB. 6–10. P. SAXIMONTANA RYDB.

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

Vol. 23. Lancaster, Pa., November 25, 1896. No. 11.

# Notes on Potentilla.—V.

By P. A. Rydberg.

(Plates 276, 277.)

The *Subviscosae* is a small group of low plants with many more or less spreading branches from the caudex, with a silky or hirsute pubescence, often intermixed with almost sessile glands, but not at all tomentose; with digitate leaves of 5–7 leaflets, and in fruit, with incurved sepals which enclose the large, but comparatively few achenes. The petals are more or less contracted at the base, *i. e.*, semi-unguiculate, although indistinctly so in *P. Wheeleri.*

POTENTILLA WHEELERI Wats. Proc. Am. Acad. 11: 148. 1876.

The pubescence is quite densely silky, and the typical form is apparently without glands. The leaflets are obovate and crenate at the rounded summit, 1–1.5 cm. long. The petals are obcordate, slightly contracted at the base, and a little exceed the calyx. It has been collected in southern California, Arizona and northern Mexico. A form connecting it with the next may be regarded as a variety or perhaps as a distinct species. It may be known for the present as

POTENTILLA WHEELERI VISCIDULA n. v.

Subcaespitose, rather hirsute with spreading hairs, somewhat glandular-granuliferous on the calyx, pedicel, etc.; leaflets shorter and broader, generally less than 1 cm. long.

The following specimens have been seen:

*Arizona:* C. G. Pringle, 1881; J. G. Lemmon, no. 158. 1881.

*California:* W. G. Wright, 1879; Coville & Funston, no. 1672. 1891.

Pringle labelled his specimens *Potentilla subviscosa* Greene (near *P. Wheeleri* Wats.). I think, however, that it should be referred to *P. Wheeleri* rather than to *P. subviscosa*, as it does not have the dissected leaves and the subunguiculate petals of *P. subviscosa.*

POTENTILLA SUBVISCOSA Greene, Bull. Torr. Bot. Club, **8**: 97. 1881.

Differs from *P. Wheeleri* in the leaflets, which are deeply cleft into oblong divisions, and the middle one often 3-divided to near the midrib, in the petals which are more or less plainly unguiculate and about one-half longer than the sepals, in the more hirsute pubescence which is intermixed with numerous glands. It resembles closely the figure of *P. Dombeyi* in Nestler's Monograph, but neither Nestler nor Lehmann mention anything concerning the glands or the unguiculate petals. *P. Dombeyi* was described from specimens from Chili, but has been reported from Mexico. I have not seen any specimens and doubt its existence there. *P. subviscosa* grows in Arizona and New Mexico.

### POTENTILLA RAMULOSA n. sp.

Stems several from the thick perennial root, about 1 dm. high, scarcely exceeding the basal leaves, more or less hirsute, and branched. Stipules lanceolate, the lower scarious and brown, the upper herbaceous; basal leaves on hirsute petioles 5–8 cm. long, finely pubescent, in age shining; leaflets 5–7, obovate, coarsely and generally doubly toothed with somewhat divergent teeth, prominently veined beneath, the larger 5–7 cm. long. Flowers slender-pediceled in an open cyme; calyx and pedicels hirsute and with numerous sessile glands; bracts oblong, a little shorter than the oblong-ovate sepals; both distinctly veined, in fruit incurved and inclosing the rather few large achenes; petals obcordate, deeply emarginate and evidently contracted in a short claw; stamens 15–20; pistils rather few; achenes striate. (Plate 276.)

*P. ramulosa* resembles *P. subviscosa*, but is a much larger plant. The leaves, by their size, pubescence and form, remind one somewhat of *P. Nuttallii* and *P. Blaskeana.* The leaflets reach a length of even 7 cm. The general habit, form of calyx and corolla, etc., are those of *P. subviscosa*, but the achenes are striate. The following specimens have been examined:

*Arizona:* J. G. Lemmon, no. 399, 1881; H. H. Rusby, 1883.

The *Concinnae* have the same relationship to the *Niveae* as the *Aureae* have to the *Frigidae, i. e.*, they are *Niveae* with more than three leaflets. From the *Subviscosae* they differ by the tomentum on at least the lower surface of the leaves, and by their petals, which are not at all unguiculate.

POTENTILLA CONCINNA Richardson, Frank. Journ. 736. 1823.

*P. concinna* resembles *P. nivea* in many respects, especially the variety *quinquefolia*, but is always more or less prostrate, and has broader petals and sepals. It is very variable as to the shape of the leaves. In the typical form the leaflets are obovate or cuneate and crenate, and slightly tomentose also on the upper surface. It ranges from Colorado to Utah and Saskatchewan.

*Potentilla concinna humistrata* Rydberg, Cont. U. S. Nat. Herb. 3: 497 (*P. concinna humifusa* Lehm. Rev. Pot. 112. *P. humifusa* Nutt. Gen. 1: 310.) is a less spreading form with leaves that are green on the upper surface, but the two forms grade into each other in so many ways that it is useless to try to draw a line between them.

### P. CONCINNA DIVISA n. v.

*P. nivea dissecta* S. Wats. Proc. Am. Acad. 7: 556, at least in part. 1873. Not *P. dissecta* Pursh, 1814.

Leaflets pinnately divided. In a few cases the leaves are also pinnate rather than palmate.

Dr. Watson included the three first specimens cited below in his *P. nivea dissecta*, but in every respect they are much nearer *P. concinna* than *P. nivea*, the sepals, petals and general habit being exactly that of the former.

*Rocky Mountains:* Douglas.

*Montana:* Howard.

*South Dakota:* Jenney. 1875; W. H. Forwood, 1887; P. A. Rydberg, nos. 672 and 673. 1892.

*Assiniboia:* John Macoun, no. 10,468, 1895.

### POTENTILLA BICRENATA n. sp.

Low and simple from an erect scaly rootstock; stem erect, 5–7 cm. high, about equalling the leaves, 1–3-flowered, nearly leafless; basal leaves on petioles 3–6 cm. long, digitately 5-foliolate, silky and greenish above, white-tomentose beneath; leaflets ½–2 cm. long, oblong-cuneate, margins entire, except at the very apex, where there are 2 (seldom 4) notches making the leaflet 3- (seldom 5-) toothed at the apex, the middle tooth generally the smallest; flowers about 1 cm. in diameter; calyx silky; bractlets and sepals ovate or lance-ovate, the former smaller; petals obovate, merely truncate.

It much-resembles the preceding, but is more delicate, not at all spreading, has a subscapiform stem and smaller flowers, but the most striking difference is the form of the leaflets.

*New Mexico:* C. D. Walcott, no. 66, 1883 (Type).

*Colorado:* E. L. Greene, 1875.

The *Multijugae* is a group of Potentillas in many respects reminding us of the *Multifidae.* The leaves in both are pinnate with several leaflets, but the pinnae in the present group are generally much more numerous; the pubescence is hirsute, strigose or silky, always without any indication of tomentum, and the style is always long and filiform. To this group belong *P. Richardii* Lehm., from Mexico, differing from *P. Plattensis* mainly in the spreading pubescence, and the following North American species:

POTENTILLA PLATTENSIS Nutt.; Torr. & Gray, Fl. N. Am. 1: 439. 1840.

The type specimens of Nuttall have light green leaves with 4–8 pairs of oblong-cuneate leaflets, dissected into broadly oblong obtuse segments ½ cm. long, and a stem that is more or less ascending. In the more common form, however, the segments are often ¾ cm. long, nearly linear and often acute, the stem more or less spreading and the flower-clusters very irregular. It may be a good variety.

All forms of *P. Plattensis* are characterized by the stipules, which are unusually large for the size of the plant. Its range is from Colorado and Utah to the Saskatchewan, but it belongs to the valleys of the high plains rather than to the alpine regions.

POTENTILLA PINNATISECTA (Wats.) Aven Nelson, Bull. Wy. Exp. St. 28: 104. 1896.

*P. diversifolia pinnatisecta* Wats. King's Rep. 5: 87 (in part), 1871.

*P. ovina* James Macoun, Can. Rec. Sci.

The specimens from which *P. diversifolia pinnatisecta* were described, viz: Watson's nos. 331 and 332 of the King Expedition illustrate, I think, not less than three different species. In the Gray Herbarium, no. 331 is represented as it seems by a typical *P. Plattensis*. This is doubtless the reason why Watson afterwards transferred the var. *pinnatisecta* to that species. No. 332, which Watson, in King's Report, characterizes as an alpine more hairy form, is there represented by a specimen of what James Macoun describes as *P. ovina*. This may be regarded as the typical *P pinnatisecta*, as the other forms of the collection are already named In the Columbia Herbarium, no. 331 is represented by an unusually large form of *P. pinnatisecta* (*P. ovina* Macoun) and no. 332 by a depauperate specimen of *P. Breweri expansa* Wats.

The main differences between *P. Plattensis* and *P. pinnatisecta* are well pointed out by Prof. Nelson, *l. c.*, only that his characterizing of *P. Plattensis* refers rather to the most common, more prostrate form with narrow segments, mentioned above, and that his specimens representing *P. pinnatisecta* are unusually large, less hairy and with longer segments than usual. The typical form is subcaespitose, seldom over 1 dm. high, with nearly leafless flowering stems, smaller stipules than in *P. Plattensis*, and a densely hoary pubescence, especially when young. It ranges from Colorado and Utah to British America, and is a strictly alpine plant.

### POTENTILLA MILLEFOLIA n. sp.

Low, prostrate or spreading; stems numerous from the caudex, about 1 dm. long, few-leaved, only a little exceeding the basal leaves, appressed-strigose, often sparingly so. Lower stipules lanceolate and scarious and brown, the upper ovate-lanceolate, acute or acuminate, green, often 2–3 cleft. Basal leaves pinnate, of many pairs, sparingly strigose-ciliate, nearly as long as the stems; stem-leaves much reduced. Leaflets divided nearly to the base into linear subulate divisions, which therefore look as if verticillate. Pedicels slender, 1–2 cm. long, in fruit abruptly reflexed below the strigose-hirsute calyx. Bractlets and sepals lanceolate, acute, the former slightly smaller. Corolla 12–18 mm. in diameter. Petals obcordate, deeply notched, longer than the sepals. Stamens about 20. Achene smooth, with a slender filiform nearly terminal style. (Plate 277, figs. 1–5.)

*P. millefolia* most resembles *P. Plattensis*, but differs in the long and very narrow segments of the leaves, the reflexed fruiting calyx and the longer sepals. The following specimens have been examined:

*California:* J. G. Lemmon, 1873, 1874, and no. 86, 1875 (Type); E. L. Greene, no. 750, 1876; J. W. Congdon, no. 277, 1880.

### POTENTILLA MULTIJUGA Lehm. Rev. Pot. 29, 1856.

This species has been lost for about 40 years. As in the collections of this country there were no specimens of a *Potentilla* whose leaves resembled those of Lehmann's plate, and as those of the latter resembled the leaves of *Horkelia cuneata*, most botanists have cited *P. multijuga* as a synonym of that species, and even Professor Greene, in Flora Fransiscana, has adopted the name. It is not very likely that such an acute observer and eminent botanist as Dr. Lehmann would have figured a *Horkelia* with true *Potentilla* flowers. In two collections, viz., those of the National Herbarium and the herbarium of Harvard University, I have found a *Potentilla* that answers Lehmann's description and plate, except that the plant is more rank and the leaflets are larger, more irregular in form and position.

*P. multijuga* resembles much *P. Plattensis*, but the leaflets are more numerous, 8–13 pairs, obovate-cuneate and toothed only toward the apex, and the sepals broader ovate and abruptly contracted at the apex. The leaflets in Lehmann's figure are about 2 cm. long; some in the latter specimens are nearly ½ decimeter. Lehmann's figure illustrates an undeveloped specimen about 2½ dm. high. Some of the better developed specimens are ¾ m. high, with leaves 3 dm. long.

### POTENTILLA DRUMMONDII Lehm. Nov. Stirp. Pug. 2 : 9. 1830.

Watson included this in *P. dissecta*. As he had only comparatively poor specimens, with few, more approximate leaflets, it was not strange that he did so, especially with his tendency of uniting forms somewhat related. Had he had such specimens as those collected by Suksdorf, or the one from which Lehmann's figure was drawn, I doubt if he had done it. Such well-developed specimens have pinnate leaves of 3–5 rather distant pairs of leaflets, very large stipules resembling those of *P. Plattensis* and a large calyx which is strongly hirsute. From *P. Plattensis* and the other species of the group it differs in the stoutness of the plant, which is 3–6 dm. high and by the fewer (2–5 pairs) and larger leaflets, which are from 3–6 cm. long, and the acute teeth. It is a rare species. The only specimens seen are the following:

*Washington:* W. N. Suksdorf, no. 539. 1875.
*Oregon:* Elihu Hall, no. 135. 1871.
*California:* J. G. Lemmon, no. 1200. 1875.
*British Columbia:* John Macoun, no. 32. 1890.
*Rocky Mountains of British America:* E. Bourgeau, 1858.

## Phyllotaxy as a Guide to Plant Analysis.

By A. L. Benedict.

There are few discrepancies in teaching more striking than the contrast between the elaborate discussion of leaf-arrangement in nearly all text-books and courses on Organography and the neglect of the subject in practical analysis.

Omitting the leaves of cryptogams and the coniferae, two methods of arrangement are found, the verticillate or whorled and the spiral, alternate or scattered. The words verticillate and whorled are really the same, if we seek their root. The term *scattered* is highly objectionable, since it suggests that the leaves occur haphazard, but nowhere in botany is a more exact mathematical system followed than in the putting forth of leaves. The term *alternate* should, from its meaning, be limited to the simplest variety of spiral phillotaxy, in which the leaves occur, first on one side and then on the other, of the stem.

If we conceive the outer layer of the stem to be made up of a number of columns of cells, we have a simple and lucid explanation of the decussation of adjacent whorls and of the spiral line in which leaves are otherwise thrown out. The development of a leaf involves a tremendous expenditure of vitality and it is easy to understand why one whorl of leaves should issue from the columns which have rested during the formation of the preceding whorl,